DESCRIPTION

The AG2103 is a high voltage, high speed power MOSFET and IGBT driver based on P_SUB P_EPI process. The floating channel driver can be used to drive two N-channel power MOSFET or IGBT in a half-bridge configuration which operates up to 600V. Logic inputs are compatible with standard CMOS or LSTTL output, down to 3.3V logic. The output drivers feature a high pulse current buffer stage designed for minimum driver cross-conduction. Propagation delays are matched to simplify use in high frequency applications.

AG2103 is available in a SOP8 and DFN8(2x3) packages.

FEATURES

- Fully operational to +600V
- 3.3V logic compatible
- dV/dt Immunity ±50V/nsec
- Floating channel designed for bootstrap operation
- Gate drive supply range from 10V to 20V
- UVLO for both channels
- Output Source / Sink Current Capability 300mA /600mA
- -5V negative Vs ability
- Matched propagation delay for both channels
- Available in a SOP8 and DFN8(2x3) packages.

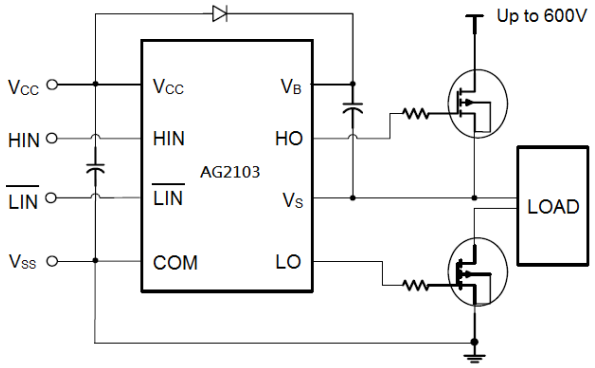
ORDERING INFORMATION

Package Type	Part Number	
SOP8 SPQ: 4,000pcs/Reel	M8	AG2103M8R
		AG2103M8VR
DFN8(2x3) SPQ: 3,000pcs/Reel	J8	AG2103J8R
		AG2103J8VR
Note	V: Halogen free Package R: Tape & Reel	
AiT provides all RoHS products		

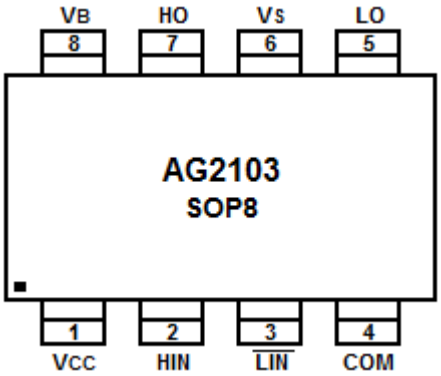
APPLICATION

- Small and medium- power motor driver
- Power MOSFET or IGBT driver
- Half-Bridge Power Converters
- Full-Bridge Power Converters

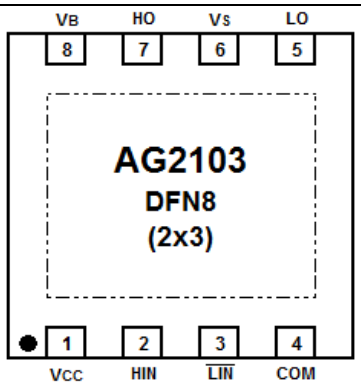
TYPICAL APPLICATION CIRCUIT



PIN DESCRIPTION



Top View



Top View

Pin #	Symbol	Function
1	V_{CC}	Low side and main power supply
2	HIN	Logic input for high side gate driver output (HO)
3	$\overline{LIN}$	Logic input for low side gate driver output (LO)
4	COM	Ground
5	LO	Low side gate drive output, out of phase with $\overline{LIN}$
6	V_S	High side floating supply return or bootstrap return
7	HO	High side gate drive output, in phase with HIN
8	V_B	High side floating supply

ABSOLUTE MAXIMUM RATINGS

V_B, High Side Floating Supply		-0.3V ~ 622V
V_S, High Side Floating Supply Return		V_B -22V ~ V_B +0.3V
V_{HO}, High Side Gate Drive Output		V_S -0.3V ~ V_B +0.3V
V_{CC}, Low Side and Main Power Supply		-0.3V ~ 22V
V_{LO}, Low Side Gate Drive Output		-0.3V ~ V_{CC} +0.3V
V_{IN}, Logic Input of HIN & $\overline{LIN}$		-0.3V ~ V_{CC} +0.3V
dV_S/dt, Allowable Offset Supply Voltage Transient		50V/ns
ESD, HBM Model		2.5kV
ESD, Machine Model		200V
P_D, Package Power Dissipation @ T_A ≤25°C	SOP8	0.625W
Rth_{JA}, Thermal Resistance Junction to Ambient	SOP8	200℃/W
T_J, Junction Temperature		150℃
T_S, Storage Temperature		-55℃~150℃
T_L, Lead Temperature (Soldering, 10 seconds)		300℃

Stress beyond above listed “Absolute Maximum Ratings” may lead permanent damage to the device. These are stress ratings only and operations of the device at these or any other conditions beyond those indicated in the operational sections of the specifications are not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

RECOMMENDED OPERATING CONDITIONS

Parameter	Symbol	Min.	Max.	Units
High Side Floating Supply	V_B	V_S +10	V_S +20	V
High Side Floating Supply Return	V_S	-	600	V
High Side Gate Drive Output Voltage	V_{HO}	V_S	V_B	V
Low Side Supply	V_{CC}	10	20	V
Low Side Gate Drive Output Voltage	V_{LO}	0	V_{CC}	V
Logic Input Voltage(HIN & $\overline{LIN}$)	V_{IN}	0	V_{CC}	V
Ambient Temperature	T_A	-40	125	℃

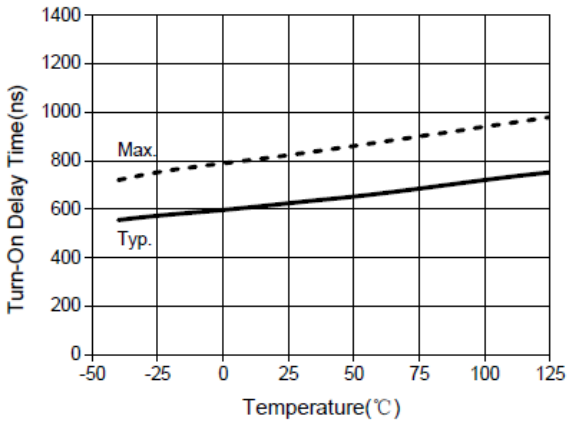
ELECTRICAL CHARACTERISTICS

V_{BIAS} (V_{CC}, V_{BS}) = 15V, C_L = 1000pF and T_A = 25°C, unless otherwise specified.

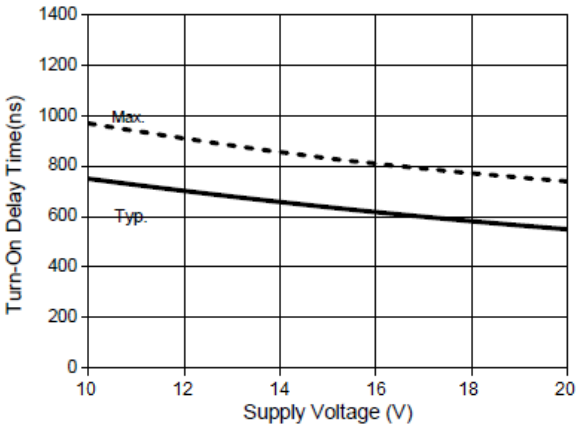
Parameter	Symbol	Conditions	Min	Typ.	Max	Units
Dynamic Electrical Characteristics						
High Side Turn-On Propagation Delay	t_{onH}		-	630	820	ns
High Side Turn-Off Propagation Delay	t_{offH}		-	140	220	
Low Side Turn-On Propagation Delay	t_{onL}		-	630	820	
Low Side Turn-Off Propagation Delay	t_{offL}		-	140	220	
Delay Matching	MT		-	-	50	
Dead time	DT		-	500	650	
Turn-On Rise Time	t_r		-	60	120	
Turn-Off Fall Time	t_f		-	35	90	
Static Electrical Characteristics						
Logic "1"(HIN & $\overline{LIN}$) Input Voltage	V_{IH}		2.5	-	-	V
Logic "0" (HIN & $\overline{LIN}$) Input Voltage	V_{IL}		-	-	0.8	
High Level Output Voltage, V_{BIAS} - V_O	V_{OH}		-	-	0.1	
Low Level Output Voltage, V_O	V_{OL}		-	-	0.1	
Quiescent V_{CC} Supply Current	I_{QCC}		-	150	270	µA
Quiescent V_B Supply Current	I_{QBS}		-	30	55	
Leakage Current from V_S(600V) to GND	I_{LK}		-	-	10	
Logic "1" input bias current (HIN "1" & $\overline{LIN}$ "0")	I_{IN}+		-	6	10	
Logic "0" input bias current (HIN "0" & $\overline{LIN}$ "1")	I_{IN}-		-	-	1	
V_{CC} Supply UVLO Threshold	V_{CCU}+		-	8.7	-	V
	V_{CCU}-		-	8	-	
Output High Short Circuit Pulsed Current	I_O+		-	300	-	mA
Output Low Short Circuit Pulsed Current	I_O-		-	600	-	

TYPICAL PERFORMANCE CHARACTERISTICS

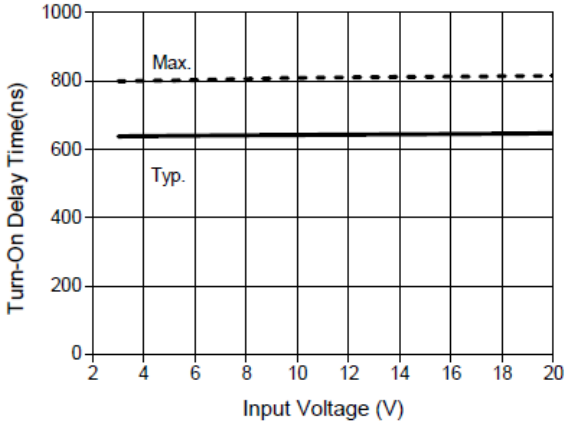
1. Turn-On Delay vs. Temperature



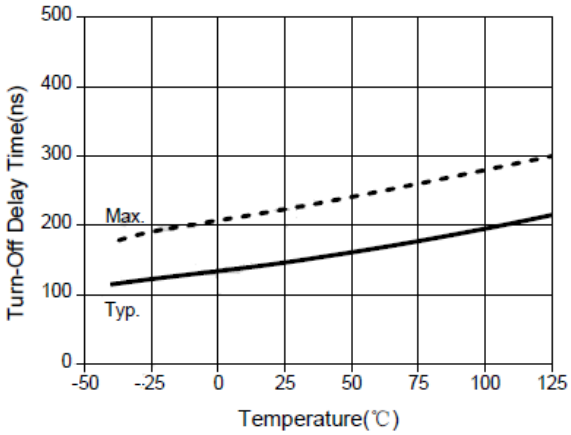
2. Turn-On Delay vs. Supply Voltage



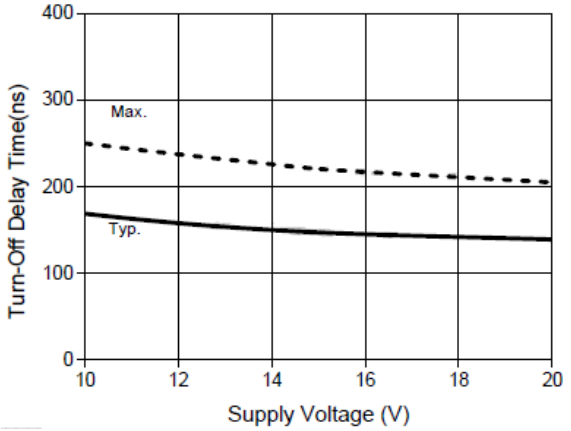
3. Turn-On Delay Time vs. Input Voltage



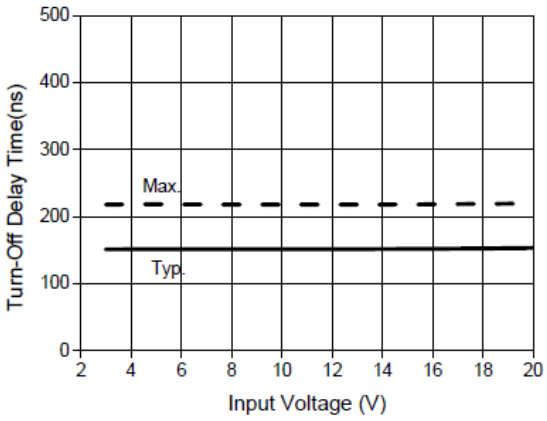
4. Turn-Off Delay Time vs. Temperature



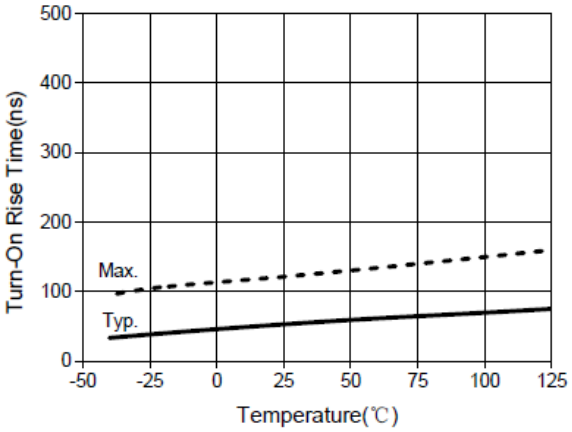
5. Turn-Off Delay Time vs. Supply Voltage



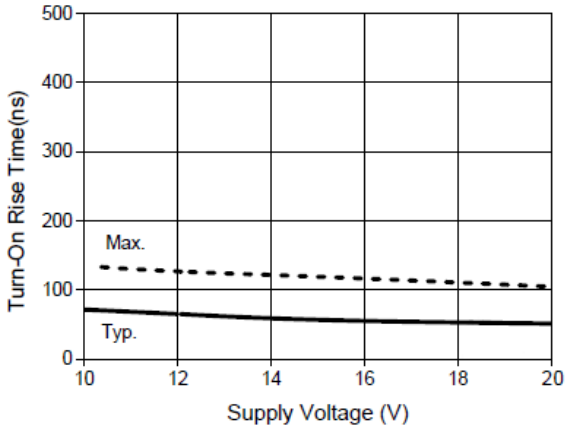
6. Turn-Off Delay Time vs. Input Voltage



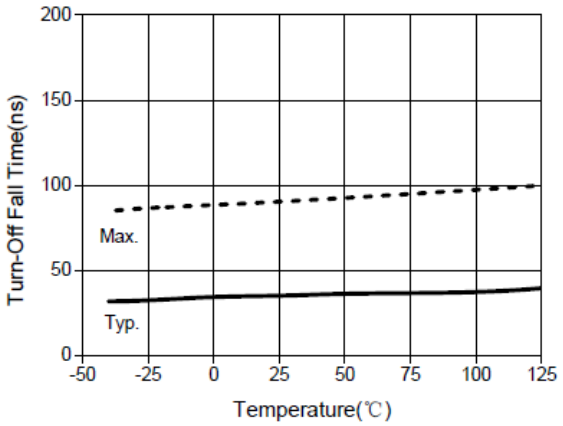
7. Turn-On Rise Time vs. Temperature



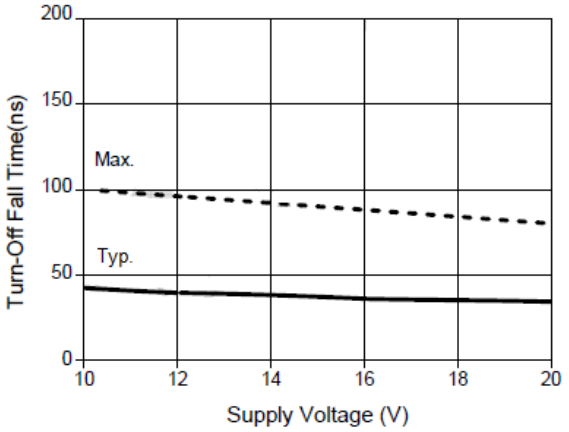
8. Turn-On Rise Time vs. Supply Voltage



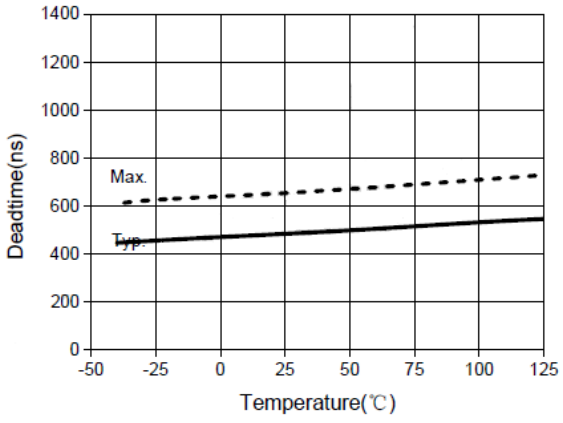
9. Turn-Off Fall Time vs. Temperature



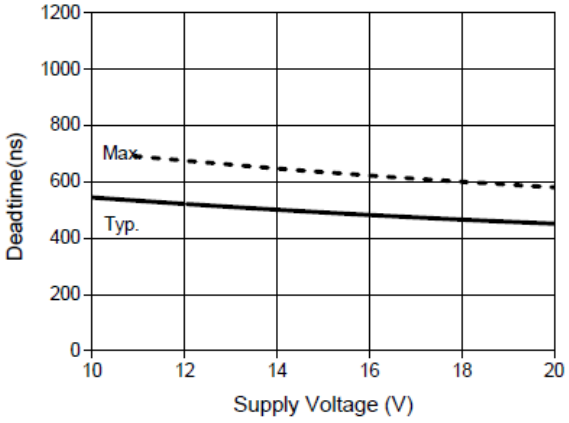
10. Turn-Off Fall Time vs. Supply Voltage



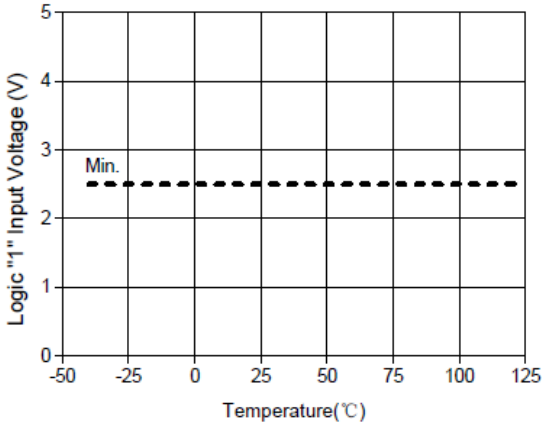
11. Dead time vs. Temperature



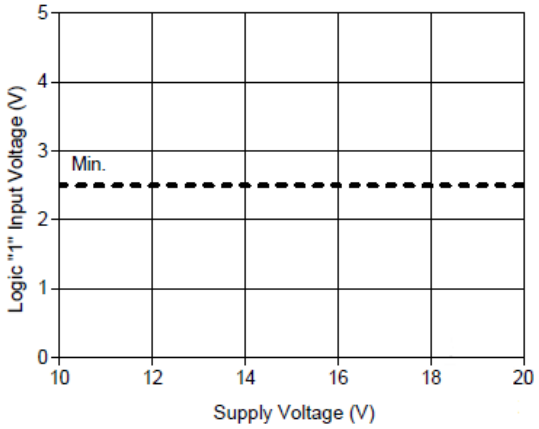
12. Dead time vs. Supply Voltage



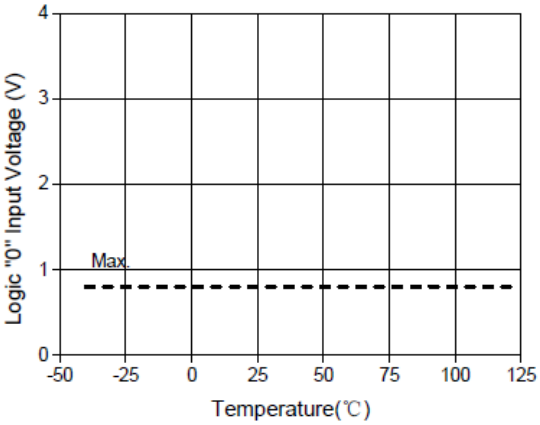
13. Logic "1" Input Voltage vs. Temperature



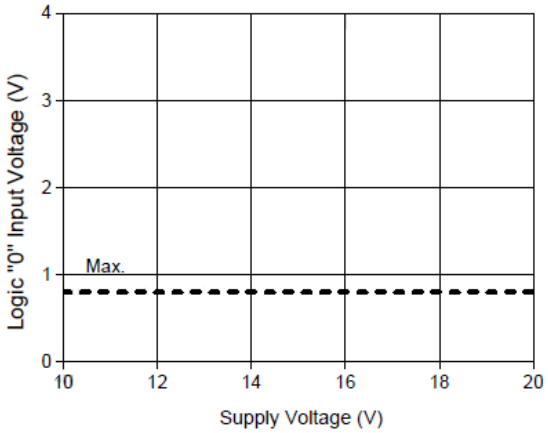
14. Logic "1" Input Voltage vs. Supply Voltage



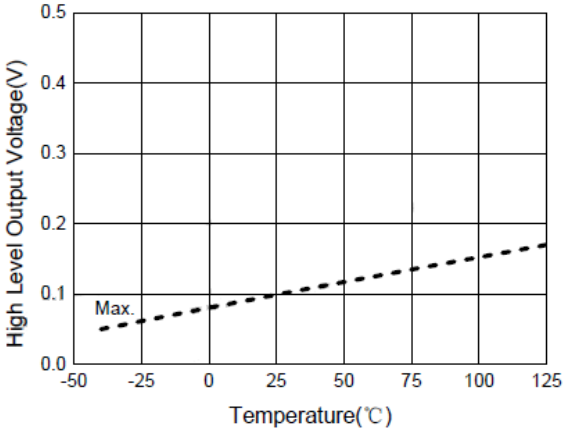
15. Logic "0" Input Voltage vs. Temperature



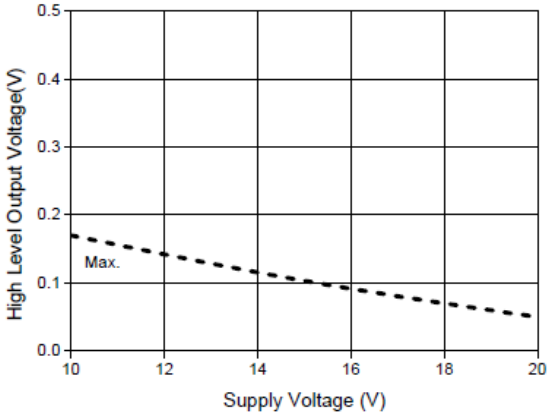
16. Logic "0" Input Voltage vs. Supply Voltage



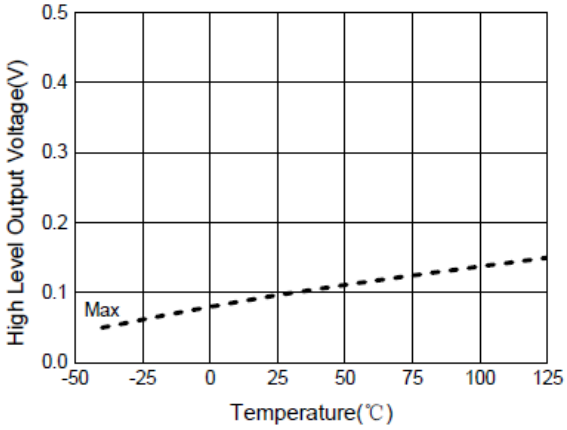
17. High Level Output vs. Temperature



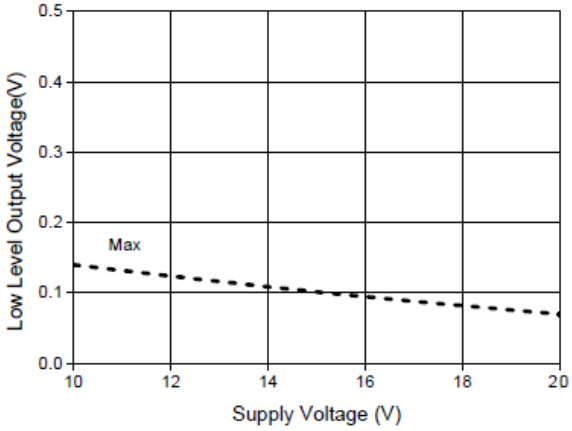
18. High Level Output vs. Supply Voltage



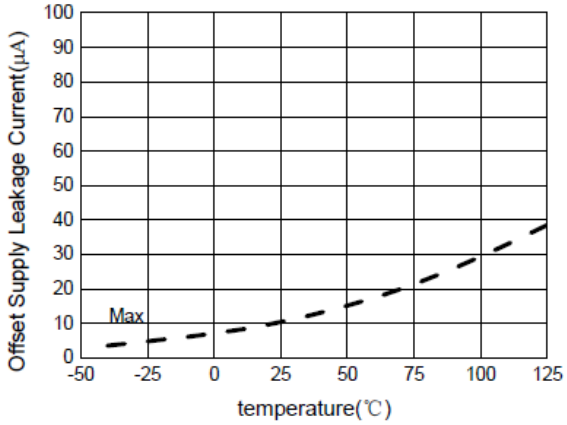
19. Low Level Output vs. Temperature



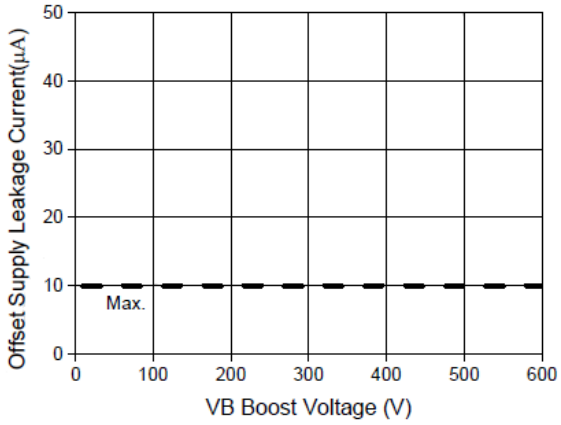
20. Low Level Output vs. Supply Voltage



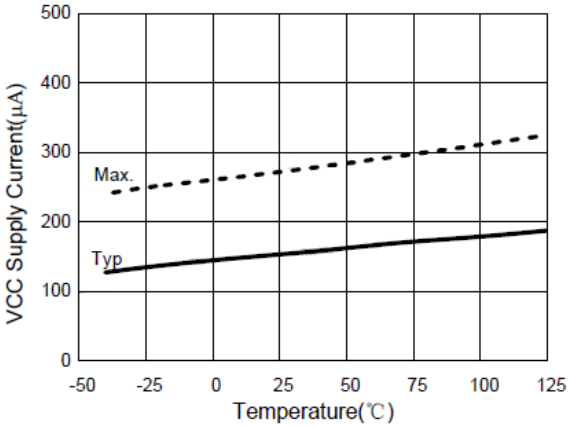
21. Offset Supply Current vs. Temperature



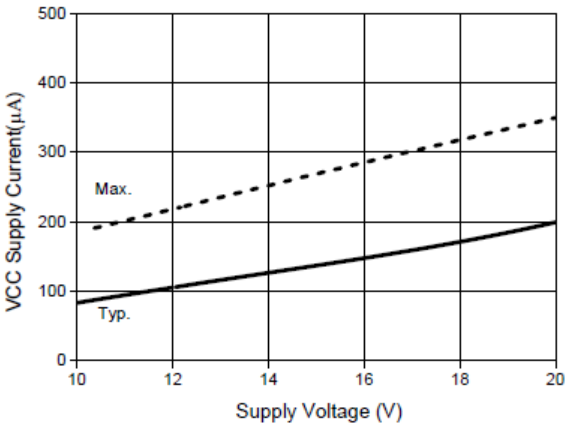
22. Offset Supply Current vs. Boost Voltage



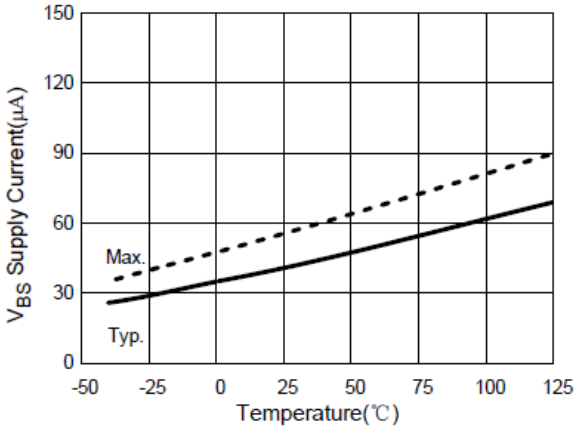
23. V_{CC} Supply Current vs. Temperature



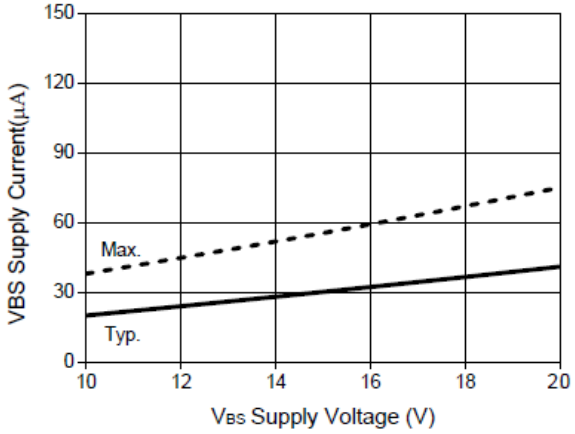
24. V_{CC} Supply Current vs. Supply Voltage



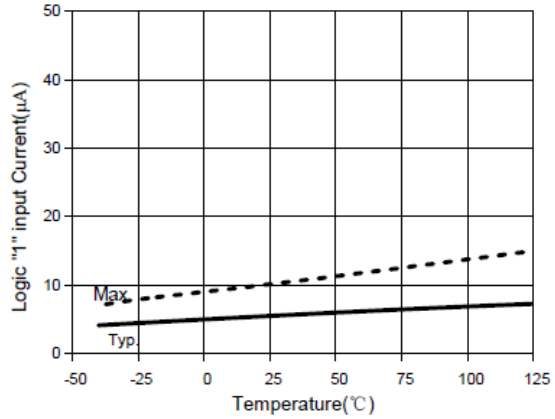
25. V_{BS} Supply Current vs. Temperature



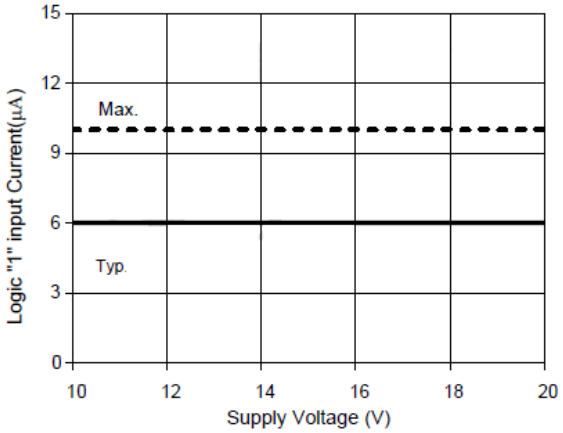
26. V_{BS} Supply Current vs. Supply Voltage



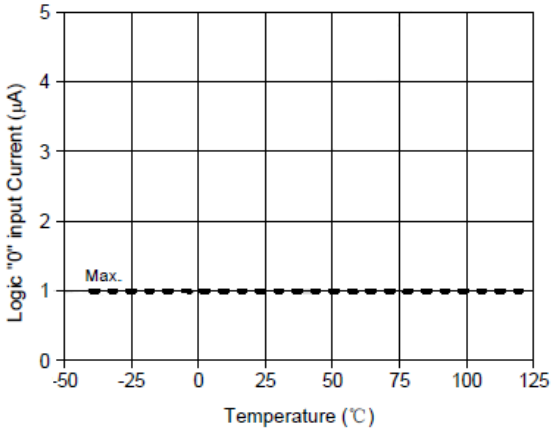
27. Logic "1" Input Current vs. Temperature



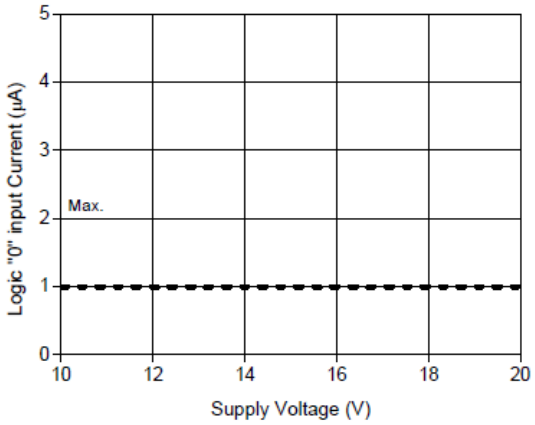
28. Logic "1" Input Current vs. Supply Voltage



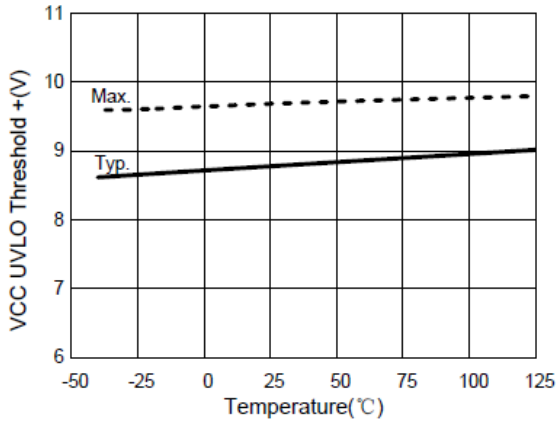
29. Logic "0" Input Current vs. Temperature



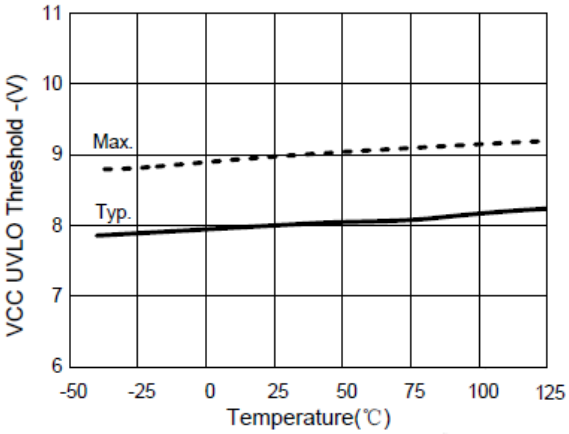
30. Logic "0" Input Current vs. Supply Voltage



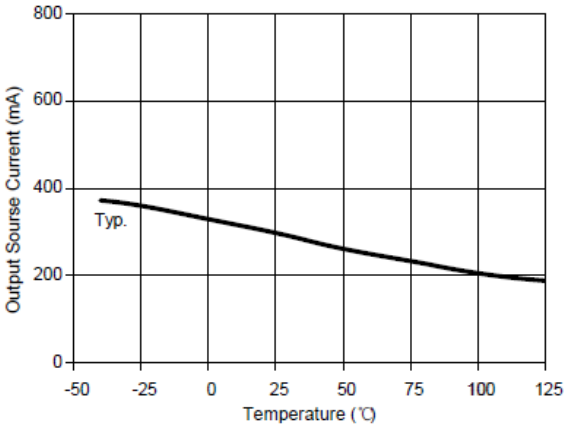
31. V_{CC} Under voltage Threshold(+) vs. Temperature



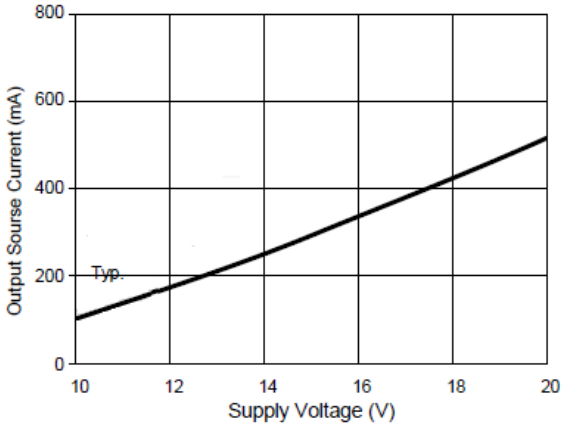
32. V_{CC} Under voltage Threshold(-) vs. Temperature



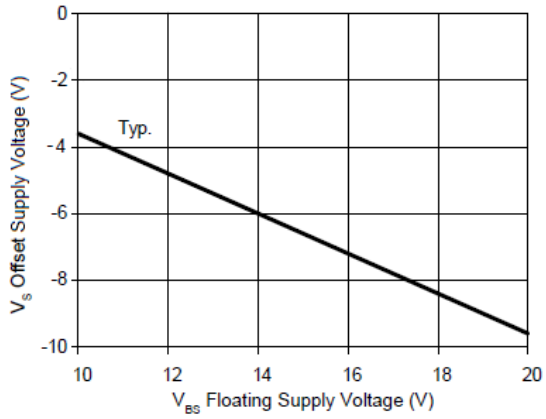
33. Output Source Current vs. Temperature



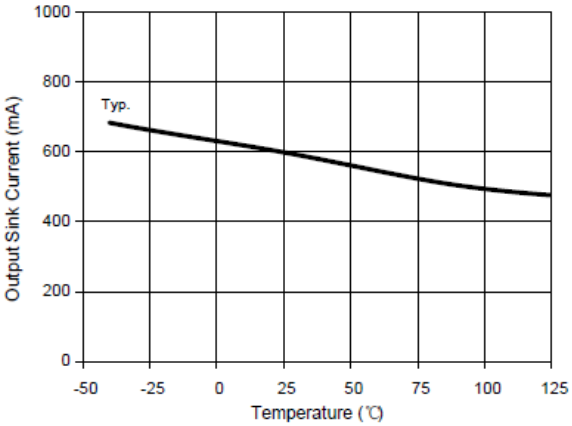
34. Output Source Current vs. Supply Voltage



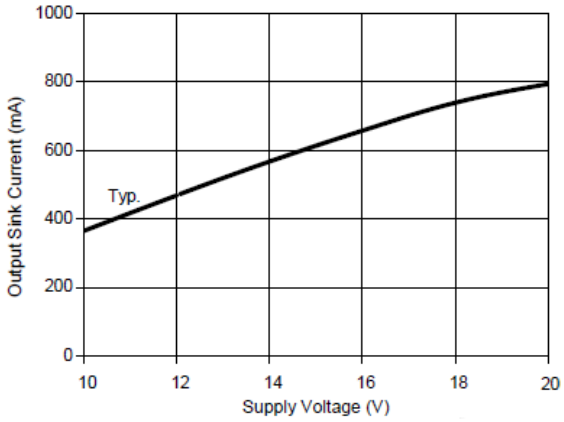
35. Maximum Vs Negative Offset vs. Supply Voltage



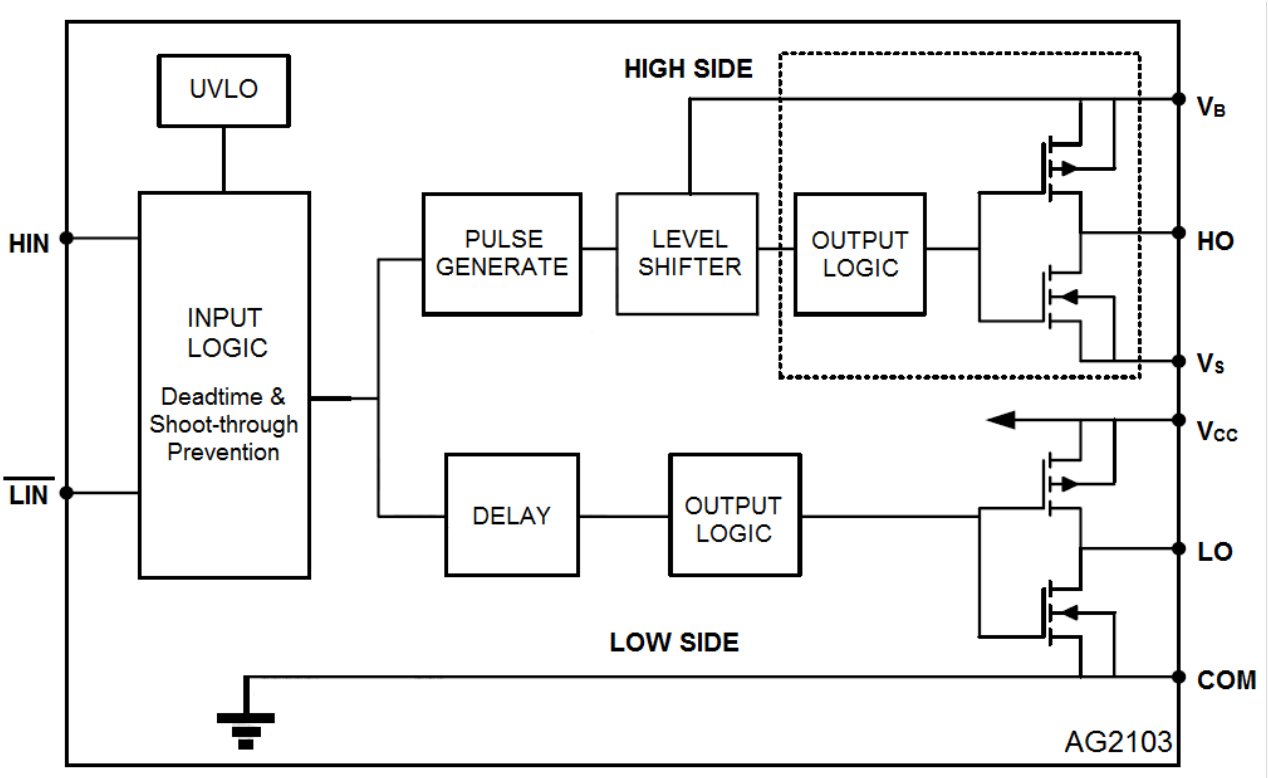
36. Output Sink Current vs. Temperature



37. Output Sink Current vs. Supply Voltage

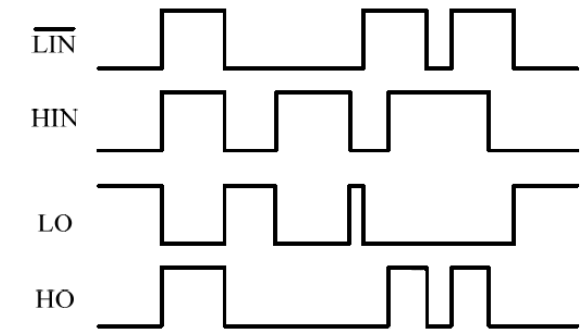


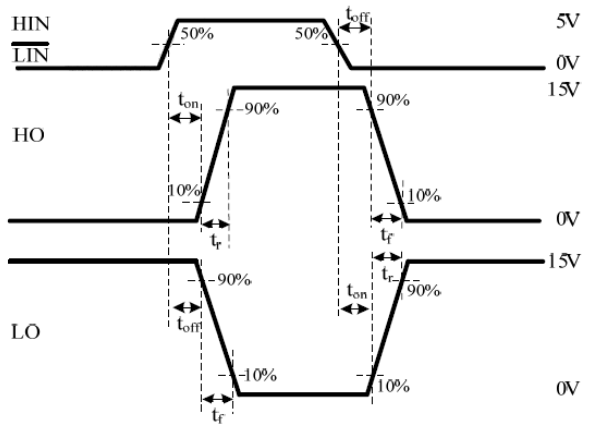
BLOCK DIAGRAM

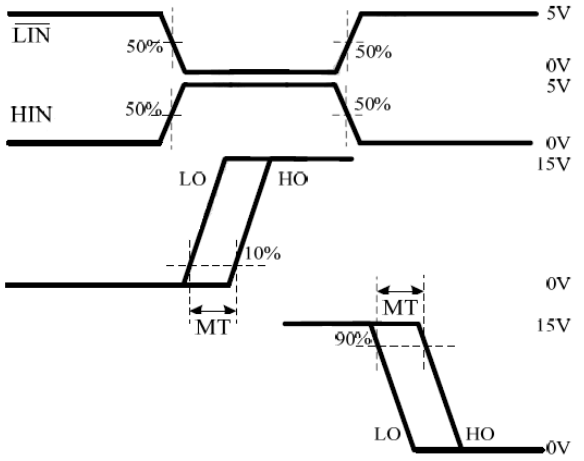


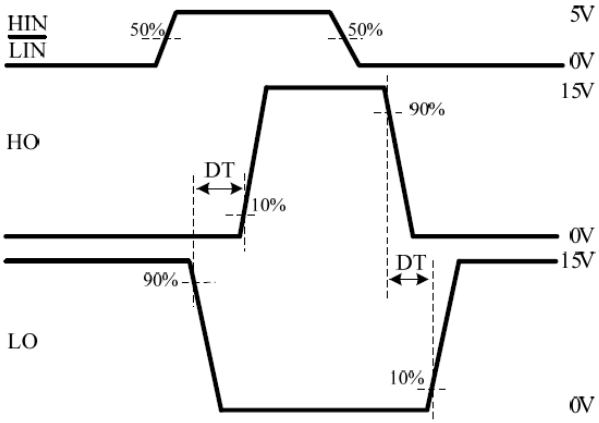
DETAILED INFORMATION

Logic Function & Timing Spec



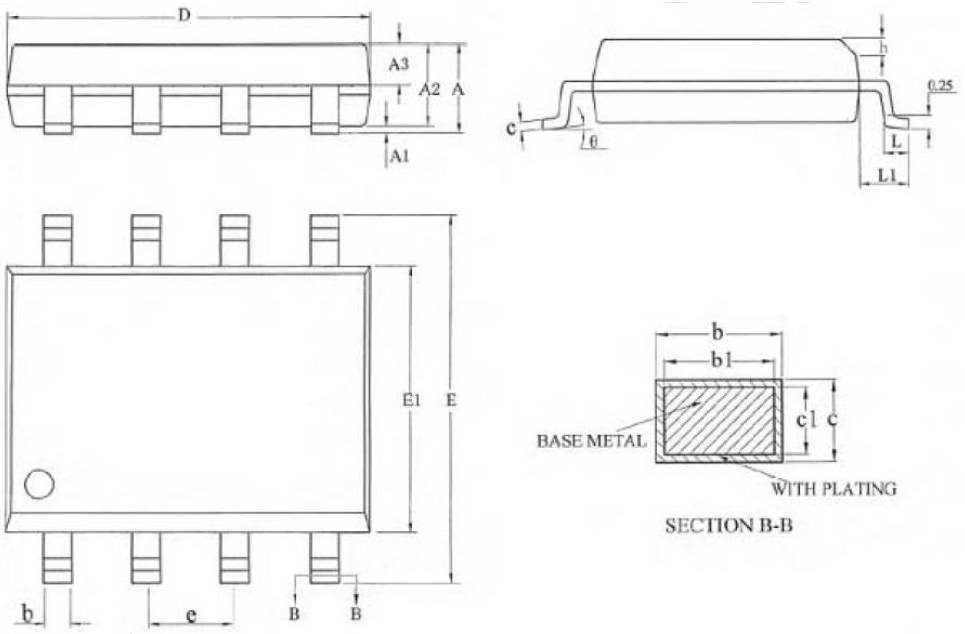






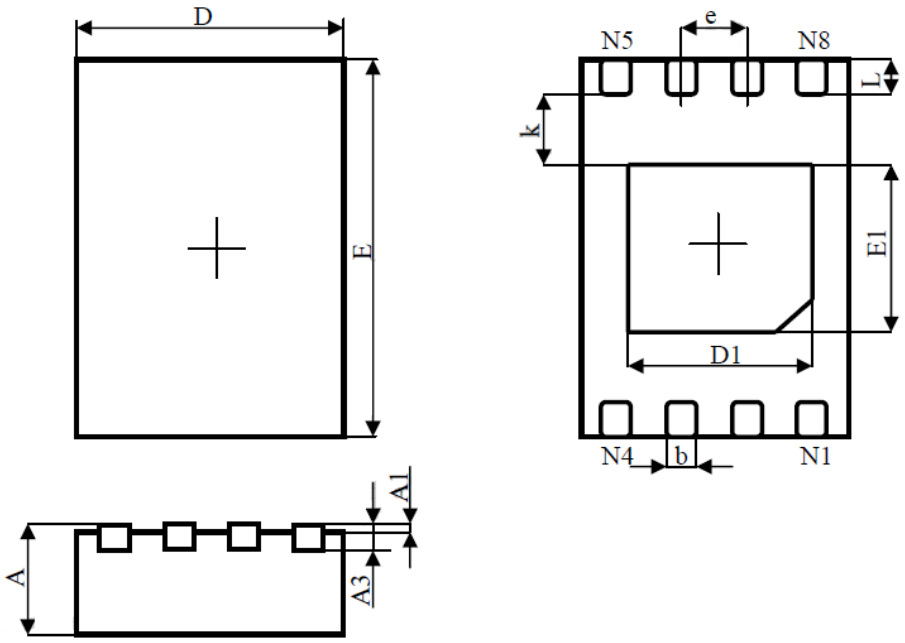
PACKAGE INFORMATION

Dimension in SOP8 (Unit: mm)



Symbol	Min.	Max.
A	-	1.75
A1	0.10	0.225
A2	1.30	1.50
A3	0.60	0.70
b	0.39	0.48
b1	0.38	0.43
c	0.21	0.26
c1	0.19	0.21
D	4.70	5.10
E	5.80	6.20
E1	3.70	4.10
e	1.27BSC	
h	0.25	0.50
L	0.50	0.80
L1	1.05BSC	
θ	0°	8°

Dimension in DFN8 (Unit: mm)



Symbol	Millimeters		Inches	
	Min	Max	Min	Max
A	0.700/0.800	0.800/0.900	0.028/0.031	0.031/0.035
A1	0.000	0.050	0.000	0.002
A3	0.203REF.		0.008REF.	
D	1.924	2.076	0.076	0.082
E	2.924	3.076	0.115	0.121
D1	1.400	1.600	0.055	0.063
E1	1.400	1.600	0.055	0.063
K	0.200MIN.		0.008MIN.	
b	0.200	0.300	0.008	0.012
e	0.500TYP.		0.020TYP.	
L	0.224	0.376	0.009	0.015

IMPORTANT NOTICE

AiT Semiconductor Inc. (AiT) reserves the right to make changes to any its product, specifications, to discontinue any integrated circuit product or service without notice, and advises its customers to obtain the latest version of relevant information to verify, before placing orders, that the information being relied on is current.

AiT Semiconductor Inc.'s integrated circuit products are not designed, intended, authorized, or warranted to be suitable for use in life support applications, devices or systems or other critical applications. Use of AiT products in such applications is understood to be fully at the risk of the customer. As used herein may involve potential risks of death, personal injury, or server property, or environmental damage. In order to minimize risks associated with the customer's applications, the customer should provide adequate design and operating safeguards.

AiT Semiconductor Inc. assumes to no liability to customer product design or application support. AiT warrants the performance of its products of the specifications applicable at the time of sale.